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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Application Number	09/901001
Filing Date	July 9, 2001
First Named Inventor	Ahn, Kie
Group Art Unit	1756
Examiner Name	Unknown DUDA

Sheet 2 of 5

Attorney Docket No: 01303.016US1

US-6207222	03/27/2001	Chen, Liang-Yuh, et al	427	97	08/24/1999
US-6211073	04/03/2001	Ahn, K. Y.	438	653	02/27/1998
US-6265311	07/24/2001	Hautala, J J, et al	438	680	04/27/1999
US-6271592	08/07/2001	Kim, E., et al	257	751	08/06/1999

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Foreign Document No	Publication Date	Name of Patentee or Applicant of cited Document	Class	Subclass	T ²
KUD	JP-07078815	03/20/1995	Miyamoto, I.	H01	217320	abstract only
KUD	JP-5-267643	10/15/1993	Muraoka, T.	H01L	029/46	abstract only

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No ¹	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ²
KUD		"Brooks Model 5964 High Performance Metal Seal Mass Flow Controller (Introduced in 1991)", <u>Brooks Instrument</u> , http://www.frco.com/brooks/semiconductor/products1i.html , (1991), 1 page	
		ANDRICACOS, P.C., "Copper On-Chip Interconnections", <u>The Electrochemical Society Interface</u> , (1999), pp. 32-37	
		ANONYMOUS, "Improved Metallurgy for Wiring Very Large Scale Integrated Circuits", <u>International Technology Disclosures</u> , 4, Abstract, (1986), 1 page	
		BAE, S., et al., "Low-Temperature Deposition Pathways to Silicon Nitride, Amorphous Silicon, Polycrystalline Silicon, and n type Amorphous Silicon Films Using a High Density Plasma System", <u>IEEE Conference Records---Abstracts, International Conference on Plasma Science</u> , (1997), pg. 315	
KUD		BERNIER, M., et al., "Laser processing of palladium for selective electroless copper plating", <u>SPIE</u> , 2045, (1994), pp. 330-337	
		BHANSALI, S., et al., "A novel technique for fabrication of metallic structures on polyimide by selective electroless copper plating using ion implantation", <u>Thin Solid Films</u> , 270, No. 1/02, (1995), pp. 489-492	
		BHANSALI, S., et al., "Selective electroless copper plating on silicon seeded by copper ion implantation", <u>Thin Solid Films</u> , 253, (1994), pp. 391-394	
		BRAUD, F., "Ultra Thin Diffusion Barriers for Cu Interconnections at The Gigabit Generation and Beyond", <u>VMIC Conference Proceedings</u> , (1996), pp. 174-179	
		CABRERA, A.L., et al., "Oxidation protection for a variety of transition metals and copper via surface silicides formed with silane containing atmospheres", <u>J. Mater. Res.</u> , 6(1), (1991), pp. 71-79	
		DE FELIPE, T.S., et al., "Electrical Stability and Microstructural Evolution in Thin Films of High Conductivity Copper Alloys", <u>IEEE</u> , (1999), pp. 293-295	
		DING, "Copper Barrier, Seed Layer and Planarization Technologies", <u>VMIC Conference Proceedings</u> , (1997), pp. 87-92	
KUD		DUBIN, V.M., et al., "Selective and Blanket Electroless Copper Deposition for	

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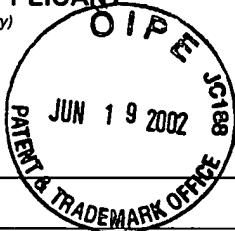
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OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS

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		Ultralarge Scale Integration", J. Electrochem. Soc., 144(3), (1997), pp. 898-908	
KAD		DUSHMAN, S., et al., Scientific Foundations of Vacuum Technique, 2nd Edition, John Wiley and Sons, (1962), 1-806	
KAD		EDELSTEIN, D., "Full Copper Wiring in a Sub-0.25 micrometer CMOS ULSI Technology", IEDM, (1997), pp. 773-776	
KAD		ELDRIDGE, J.M., "New Approaches for Investigating Corrosion in Thin Film Devices", Electronic Packaging and Corrosion in Microelectronics, PROCEEDINGS of ASM's Third Conference on Electric Packaging: Materials and Processes & Corrosion in Microelectronics, Mpls, MN, (1987), pp. 283-285	
KAD		FUKUDA, T., et al., "0.5 -micrometer-Pitch Copper-Dual-Damascene Metallization Using Organic SOG (k=2.9) for 0.18-micrometer CMOS Applications", IEEE, (1999), pp. 619-622	
		GLADLFELTER, W.L., et al., "Trimethylamine Complexes of Alane as Precursors for the Low-Pressure Chemical Vapor Deposition of Aluminum", Chemistry of Materials, 1, (1989), pp. 339-343	
		GODBEY, D.J., et al., "Copper Diffusion in Organic Polymer Resists and Inter-level Dielectrics", Thin Solid Films, 308-309, (1997), pp. 470-474	
		GRIMBLAT, J., et al., "II. Oxidation of Aluminum Films", J. Electrochem., 129, (1982), pp. 2369-2372	
		HATTANGADY, S.V., et al., "Integrated processing of silicon oxynitride films by combined plasma and rapid-thermal processing", J. Vac. Sci. Technol. A, 14(6), (1996), pp. 3017-3023	
KAD		HIRATA, A., et al., "WSiN Diffusion Barrier Formed by ECR Plasma Nitridation for Copper Damascene Interconnection", 16th Solid State Devices and Materials, (1998), pp. 260-261	
		HOLLOWAY, K., et al., "Tantalum as a diffusion barrier between copper and silicon", Appl. Phys. Lett., 57(17), (October 1990), pp. 1736-1738	
		HU, C.K., et al., "Extendibility of Cu Damascene to 0.1 micrometer Wide Interconnections", Mat. Res. Soc. Symp. Proc, 514, (1998), pp. 287-292	
		HYMES, S., et al., "Passivation of Copper by Silicide Formation in Dilute Silane", Conference Proceedings ULSI-VII, (1992), pp. 425-431	
		IJIMA, T., "Microstructure and Electrical Properties of Amorphous W-Si-N Barrier Layer for Cu Interconnections", 1996 VMIC Conference, (1996), pp. 168-173	
		JEON, Y., et al., "Low-Temperature Fabrication of Polycrystalline Silicon Thin Films by ECR Pecvd", The Electrochemical Society Proceedings, 94(35), (1995), pp. 103-114	
		KAMINS, T.I., "Structure and Properties of LPCVD Silicon Films", J. Electrochem. Soc.: Solid-State Science and Technology, 127, (March 1980), pp. 686-690	
KAD		KEPPNER, H., et al., "The "Micromorph" Cell: A New Way to High-Efficiency-Low-Temperature Crystalline Silicon Thin-Film Cell Manufacturing", Mat. Res.	

EXAMINER

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First Named Inventor	Ahn, Kie
Group Art Unit	1756
Examiner Name	Unknown DUDA

Sheet 4 of 5

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OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS

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ICAD		Soc. Symp. Proc., 452, (1997), pp. 865-876	
		KIANG, M., et al., "Pd/Si plasma immersion ion implantation for selective electroless copper plating on SiO ₂ ", <u>Appl. Phys. Lett.</u> , 60, (1992), pp. 2767-2769	
		KISTIAKOWSKY, G.B., et al., "Reactions of Nitrogen Atoms. I. Oxygen and Oxides of Nitrogen", <u>The Journal of Chemical Physics</u> , 27(5), (1957), pp. 1141-1149	
		KLAUS, J.W., "Atomic Layer Deposition of Tungsten Nitride Films Using Sequential Surface Reactions", <u>Journal of the Electrochemical Society</u> , 147(3), (2000), pp. 1175-1181	
		LAURSEN, T., "Encapsulation of Copper by Nitridation of Cu-Ti Alloy/Bilayer Structures", <u>International Conference on Metallurgical Coatings and Thin Films</u> , Abstract No. H1.03, San Diego, CA, (April 1997); pg. 309	
		LEN, V., et al., "An investigation into the performance of diffusion barrier materials against copper diffusion using metal-oxide-semiconductor (MOS) capacitor structures", <u>Solid-State Electronics</u> , 43, (1999), pp. 1045-1049	
		LYMAN, T., et al., "Metallography, Structures and Phase Diagrams", <u>Metals Handbook</u> , 8, American Society for Metals, Metals Park, Ohio, (1989), pgs. 300 & 302	
ICAD		MARCADAL, C., "OMCVD Copper Process for Dual Damascene Metallization", <u>VMIC Conference, ISMIC</u> , (1997), pp. 93-97	
		MILLER, R.D., et al., "Low Dielectric Constant Polyimides and Polyimide Nanofoams", <u>Seventh Meeting of the DuPont Symposium on Polyimides in Microelectronics</u> , (September 1996), pp. 443-473	
		MIN, JAE-SIK, "Metal-Organic Atomic-Layer Deposition of Titanium-Silicon-Nitride Films", <u>Applied Physics Letters</u> , Volume 75, No. 11, (1999), pp. 1521-1523	
		MURARKA, S.P., et al., "Copper Interconnection Schemes: Elimination of The Need of Diffusion Barrier/Adhesion Promoter by the Use of Corrosion Resistant, Low Resistivity Doped Copper", <u>SPIE</u> , 2335, (1994), pp. 80-90	
		NAKAO, S., et al., "Thin and Low-Resistivity Tantalum Nitride Diffusion Barrier and Giant-Grain Copper Interconnects for Advanced ULSI Metallization", <u>Japanese Journal of Applied Physics</u> , 38(4B), (April 1999), pgs. 262-263	
		NEWBOE, B., et al., "Applied Materials Announces First Barrier/Seed Layer System For Copper Interconnects", <u>Applied Materials</u> , http://www.appliedmaterials.com/newsroom/pr-00103.html , (1997), pgs. 1-4	
		OKAMOTO, Y., et al., "Magnetically Excited Plasma Oxynitridation of Si at Room Temperature", <u>Jpn. J. Appl. Phys.</u> , 34, (1995), pp. L955-957	
		RADZIMSKI, Z.J., et al., "Directional Copper Deposition using d-c Magnetron Self-sputtering", <u>J. Vac. Sci. Technol. B</u> , 16(3), (1998), pp. 1102-1106	
ICAD		RATH, J.K., et al., "Low-Temperature deposition of polycrystalline silicon thin films by hot-wire CVD", <u>Solar Energy Materials and Solar Cells</u> , 48, (1997), pp. 269-277	

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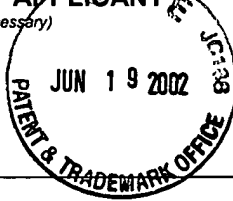
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Application Number 09/901001

Filing Date July 9, 2001

First Named Inventor Ahn, Kie #2

Group Art Unit 1756

Examiner Name Unknown Duda

Sheet 1 of 5

Attorney Docket No: 01303.016US1

US PATENT DOCUMENTS

Examiner Initial *	USP Document Number	Publication Date	Name of Patentee or Applicant of cited Document	Class	Subclass	Filing Date If Appropriate
KUD	US-2842438	07/08/1958	Saarivirta, M. J., et al	75	153	08/02/1956
KUD	US-4565157	01/21/1986	Brors, D. L., et al	118	719	03/29/1983
KUD	US-4762728	08/09/1988	Keyser, T., et al	427	38	11/26/1985
	US-4847111	07/11/1989	Chow, Yu C., et al	427	38	06/30/1988
	US-4962058	10/09/1990	Cronin, J. E., et al	437	187	04/14/1989
	US-5084412	01/28/1992	Nakasaki, Yasushi	437	189	10/01/1990
	US-5130274	07/14/1992	Harper, J. M., et al	437	195	04/05/1991
	US-5158986	10/27/1992	Cha, S. W., et al	521	82	04/05/1991
	US-5173442	12/22/1992	Carey, D. H.	437	173	03/24/1992
	US-5231056	07/27/1993	Sandhu, G. S.	437	200	01/15/1992
	US-5240878	08/31/1993	Fitzsimmons, J., et al	437	187	04/26/1991
	US-5371042	12/06/1994	Ong, E.	437	194	06/16/1992
KUD	US-5413687	05/09/1995	Barton, C. L., et al	204	192.14	11/27/1991
	US-5609721	03/11/1997	Tsukune, A., et al	156	646.1	01/03/1995
	US-5654245	08/05/1997	Allen, Gregory Lee	438	629	03/23/1993
	US-5670420	09/23/1997	Choi, Kyeong Kenn	437	189	11/08/1995
	US-5763953	06/09/1998	Iijima, T., et al	257	762	01/18/1996
	US-5824599	10/20/1998	Schacham-Diamond, Yosef, et al	438	678	01/16/1996
	US-5891797	04/06/1999	Farrar, P. A.	438	619	10/20/1997
	US-5948467	09/07/1999	Nguyen, T., et al	427	99	07/24/1998
	US-5962923	10/05/1999	Xu, Z., et al	257	774	08/07/1995
	US-5972179	10/26/1999	Chittipeddi, et al	204	192.17	09/30/1997
KUD	US-5994777	11/30/1999	Farrar, P. A.	257	758	08/26/1998
	US-6015465	01/18/2000	Kholodenko, A., et al	118	719	04/08/1998
	US-6017820	01/25/2000	Ting, C. H., et al	438	689	07/17/1998
	US-6065424	05/23/2000	Shacham-Diamond, Y., et al	118	696	12/18/1996
	US-6071810	06/06/2000	Wada, Junichi, et al	438	635	12/23/1997
	US-6136095	10/24/2000	Xu, Z., et al	118	719	10/06/1997
	US-6139699	10/31/2000	Chiang, T., et al	204	192.15	05/27/1997
	US-6140228	10/31/2000	Shan, E., et al	438	653	11/13/1997
	US-6143646	11/07/2000	Wetzel, J. T.	438	637	06/03/1997
	US-6153507	11/28/2000	Mikagi, K.	438	618	01/13/1998
KUD	US-6171661	01/09/2001	Zheng, B., et al	427	535	02/25/1998
	US-6177350	01/23/2001	Sundarrajan, A., et al	438	688	04/14/1998
	US-6183564	02/06/2001	Reynolds, G. J., et al	118	719	11/12/1998
	US-6190732	02/20/2001	Omstead, et al	118	729	
KUD	US-6197688	03/06/2001	Simpson, Cindy Reidsema	438	678	02/12/1998

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Sheet 5 of 5

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KAD		RAY, S.K., et al., "Flourine-enhanced nitridation of silicon at low temperatures in a microwave plasma", <u>J. Appl. Phys.</u> , 70(3), (1991), pp. 1874-1876	
		ROSSNAGEL, S.M., et al., "Metal ion deposition from ionized magnetron sputtering discharge", <u>J. Vac. Sci. Technol. B</u> , 12(1), (1994), pp. 449-453	
		RYAN, J.G., "Copper Interconnects for Advanced Logic and DRAM", Extended Abstracts of the 1998 International Conference on Solid-State Devices and Materials, Hiroshima, (1998), pp. 258-259	
		RYU, C., et al., "Barriers for copper interconnections", <u>Solid State Technology</u> , (April 1999), pp. 53, 54, 56	
		SAARIVIRTA, J., "High Conductivity Copper Rich Cu-Zr Alloys", <u>Transactions of the Metallurgical Society of AIME</u> , 218, (1960), pp. 431-437	
		SENZAKI, Y., "Chemical Vapor Deposition of Copper using a New Liquid Precursor with Improved Thermal Stability", <u>Conference Proceedings ULSI XIII, Materials Research Society</u> , (1998), pp. 451-455	
KAD		SHACHAM-DIAMOND, Y., et al., "Copper electroless deposition technology for ultra-large-scale-integration (ULSI) metallization", <u>Microelectronic Engineering</u> , 33, (1997), pp. 47-58	
		STROUD, P.T., et al., "Preferential deposition of silver induced by low energy gold ion implantation", <u>Thin Solid Films</u> , Switzerland, Vol. 9, No. 2, XP000993098, (Feb. 1972), 273-281	
		TSUKADA, T., et al., "Adhesion of copper films on ABS polymers deposited in an internal magnet magnetron sputtering system", <u>J. Vac. Sci. Technol.</u> , 16(2), (1979), 348-351	
		VENKATESAN, S., et al., "A High Performance 1.8V, 0.20 micrometer CMOS Technology with Copper Metalization", <u>IEEE</u> , (1997), pp. 769-772	
		VOSSSEN, J.L., et al., <u>Thin Film Processes II</u> , Academic Press, Inc., (1991), 1-866	
		WANG, K., et al., "Very Low Temperature Deposition of Polycrystalline Silicon Films with Micro-Meter-Order Grains on SiO ₂ ", <u>Mat. Res. Soc. Symp. Proc.</u> , 355, (1995), pp. 581-586	
		WINTERS, H.F., et al., "Influence of Surface Absorption Characteristics on Reactivity Sputtered Films Grown in the Biased and Unbiased Modes", <u>J. Appl. Phys.</u> , 43(3), (1972), pp. 794-799	
		YEH, J.L., et al., "Selective Copper plating of Polysilicon Surface Micromachined Structures", <u>Solid-State Sensor and Actuator Workshop</u> , (1998), pp. 248-251	
KAD		ZHANG, J., et al., "Investigations of photo-induced decomposition of palladium acetate for electroless copper plating", <u>Thin Solid Films</u> , 318, (1998), pp. 234-238	

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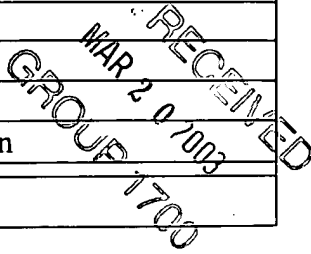
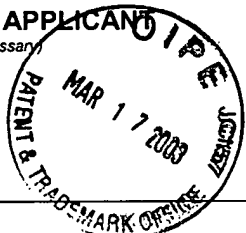
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	Group Art Unit	1756
	Examiner Name	Duda, Kathleen
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US PATENT DOCUMENTS						
Examiner Initial *	USP Document Number	Publication Date	Name of Patentee or Applicant of cited Document	Class	Subclass	Filing Date If Appropriate
KND	US-4,394,223	07/19/1983	Hall, Dean	204	15	10/06/1981
KND	US-5,034,799	07/23/1991	Tomita, K. , et al.	357	71	02/14/1990
KND	US-6,140,234	10/31/2000	Uzoh, Cyprian , et al.	438	678	01/20/1998
KND	US-6,372,622	04/16/2002	Tan, , et al.	438	612	10/26/1999
KND	US-6,387,542	05/14/2002	Kozlov, Alexander , et al.	428	673	07/06/2000
KND	US-6,403,481	06/11/2002	Matsuda, T. , et al.	438	687	08/10/1999

FOREIGN PATENT DOCUMENTS						
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